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ABSTRACT

A synopsis is provided of a 6-year research and development effort to investigate the feasibility and desirability of using computer assistance to improve leadership and management practices at RTCs (Recruit Training Commands). Information has been derived on the suitability of two computer systems and various approaches for employing these systems in pursuit of the improvement goal. These approaches encompass instruction and performance evaluation for Company Commanders, as well as more general information acquisition and processing capability to assist in the management of RTCs. Some of these programs are ready for operational use, while others would require considerable development and testing prior to operational implementation. Samples of management and evaluation systems outputs are appended. (Author/CMV)

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A COMPUTERIZED EVALUATION AND TRAINING SYSTEM (CETS) FOR RECRUIT TRAINING COMMANDS: AN OVERVIEW

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and
Dennis R. Weller

November 1978

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides a synopsis of a six-year research and development effort to investigate the feasibility and desirability of using computer assistance to improve leadership and management practices at RTCs (Recruit Training Commands). Information has been derived on the suitability of two computer systems and various approaches for employing these systems in pursuit of this goal. These approaches encompass instruction and performance evaluation for Company Commanders (CCs) as well as more general information acquisition and processing capability to assist in the management of RTCs. Some of these programs (Continued)

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are ready for operational use, while others would require considerable development and testing prior to operational implementation.

SUMMARY

This report provides a synopsis of a six-year research and development (R&D) effort to investigate the feasibility and desirability of using computer assistance to improve leadership and management practices at Recruit Training Commands (RTCs). Information has been derived on the suitability of two computer systems and various approaches for employing these systems in pursuit of this goal. These approaches encompass instruction and performance evaluation for Company Commanders (CCs) as well as more general information acquisition and processing capabilities to assist in the management of RTCs.

Some of these programs are ready for operational use, while others would require considerable development and testing prior to operational implementation. There is a variety of unique and important contributions (e.g., behavioral objectives, training strategies, analytic procedures) to be derived from each of the programs, regardless of their state of operational readiness. Further, a new slant on the concept concerning organizational development was introduced, and the foundations for its operational implementation have been laid. This concept involves the introduction of a "self-correcting" feature into the organization. It appears that this feature is required for general organizational effectiveness and especially for improvement in the areas of leadership and management. An effort is now underway to make this feature a permanent part of RTC.

Preliminary evidence is available to indicate that, for the most part, RTC Orlando does have the capabilities and motivation required to properly use, maintain and extend the various components of Computerized Evaluation and Training System (CETS) and is proceeding vigorously to do so. This report presents some highly regarded projects, utilizing CETS, which have been planned and initiated under RTC initiative and control since the termination of most Naval Training Equipment Center (NAVTRAEQUIPCEN) involvement in the project a couple of months ago. The extent to which "self-correcting" orientations, such as exhibited at RTC Orlando, persist or can be instituted where it is lacking is a subject for further investigation. The existence of proper user attitudes and orientations is especially critical to this project because the system, in its present state of development, still requires considerable levels of creativity and skill to exploit many of its current and potential capabilities. These demanding personnel requirements should be reduced as further development and use of the system establishes routine procedures of operation and places greater burden for its operation on the computer.

The evaluation and demonstration of training and cost-effectiveness is a perennial problem in this area of research, and it was a problem in this project. The informational programs and the associated "self-correcting" feature of CETS are viewed as a promising approach to remedying many of these problems. The present efforts at program development and evaluation, however, took place under more traditional conditions. In spite of the limitations inherent in the traditional approach, generally favorable and encouraging results were obtained.

The need for a different R&D paradigm became evident when some important results were found to be inconsistent from one situation to another and certain issues critical to the R&D could not be addressed using traditional R&D procedures. All things considered, there appears to be adequate evidence to

merit further development and use of the CETS concept and associated products in the Navy. In this regard, a number of recommendations are made:

a. The CETS capability should be implemented at one RTC and then, if warranted, at the three RTCs. (This process would require assurance that the system is operationally ready and that the RTCs have the capability to properly utilize it.)

b. Once implemented, the self-evaluating and self-correcting capabilities of CETS should be utilized to continually improve the system. This can be done, for example, by correlating the various measures which are intended to be predictors of CC success with the CC success criterion measures, and eliminating those variables which do not predict at an acceptable level. Also, new variables can be added to the system at any time, and tested for their predictive validity. The self-evaluation process should be a continuous one, since changes in the organization may alter the utility of the CETS variables.

c. Continued efforts to determine the best and most valid measures of training effectiveness should be given high priority, and these measures should be included in the CETS system for evaluation and improvement of all aspects of organizational operations.

d. Alternate techniques for implementing and exploiting the present programs should be investigated as part of the operational R&D effort.

e. Further laboratory investigations should be carried out to develop innovative programs for improving the quality of leadership/management actions.

f. The various products and by-products of this project (e.g., training programs, training strategies, developmental procedures, evaluation procedures, performance evaluation approaches, behavioral objectives, etc.) should be considered for possible contributions to, and integration with, other R&D efforts in the area.

g. A coordinated tri-service R&D effort should be considered for this area wherein common programs are developed for use across all segments of the military.

h. To determine the feasibility, desirability, and general nature of this tri-service effort, the conditions and requirements of all potential users of the programs should be identified and the nature of all related ongoing and planned R&D and operational programs should be reviewed.

PREFACE

Since its initiation in early 1973, this project has been funded at various times by the Defense Advanced Research Projects Agency, the Navy Personnel Research and Development Center, and the Office of Naval Research.

Original conceptions for the project were established by Dr. Jim Regan as a test of the PLATO IV computer-based system. The project has evolved since that time to include many objectives in addition to those originally defined.

Many people, both military and civilian, have contributed to this project over the years. In recent times, the outstanding efforts and attitudes of LCDR William Sullivan and CTRCS Paul Zetterholm of RTC Orlando have contributed invaluably to the project. Mr. Marty Smith, aided by Mr. Pat Smith, extended and refined the complex computer programs that he developed in earlier efforts. Pat Smith additionally performed many of the critical day-to-day tasks of system operation and evaluation. Mr. George Romot continued to assure proper liaison between the NAVTRAEQUIPCEN and RTC in the sensitive and difficult areas of system implementation and acceptance.

A one-year field trial is being planned in which RTC will assume control of most of the operations of the system. NAVTRAEQUIPCEN support will be mainly in the area of software maintenance. This trial period will provide critical information on the viability of the present system at an RTC. Additionally, this trial period will indicate the desirability of performing further research and development to improve the system's viability. Information on the ability of RTC to effectively utilize the system was not available from earlier field tests because of the extensive involvement of NAVTRAEQUIPCEN personnel. Also, some of the more desirable capabilities of the system were not available for operational employment until recently. Future plans for the system will be based on the outcome of this field test.

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SECTION I

INTRODUCTION

The management and leadership area is a major source of problems in organizations. Of particular concern are the affective and interpersonal components of this area; because these components are critical to organizational success, and because they are so resistant to efforts to improve them.

RTCs have an additional reason for interest in this area. Not only are effective leadership and management practices critical to their mission, but a large part of their mission is to instill such practices in others.

In view of the contribution of computers to other instructional areas, a series of studies was initiated in early 1973 to investigate the feasibility of using a computer to improve leadership and management practices at RTCs. Special emphasis was to be placed on the interpersonal and affective areas. Prior investigations in this area were practically nonexistant (with two exceptions[1,2]), so it was necessary to begin the project by identifying a variety of ways in which a computer might be applied to this area. Several of these potential applications were developed and evaluated, providing a basis for further research and application in the area.

This approach to the project evolved from an originating plan to evaluate the capabilities of the PLATO IV computer-based education system[3] for improving the attitudes, and thereby the behaviors of CCs at RTCs. The original intention was to focus attention on attitudes toward general concepts (e.g., job satisfaction, respect for recruits). Prior research findings[4,5], however, indicated that the instruction would be better directed at attitudes toward the specific behaviors desired on the job.

The original conception of the project was further modified to include training on the types of behaviors that a CC should perform. The idea of this approach was that, for certain kinds of CC behaviors, direct modification of the behaviors through instruction and practice is the best way to change both attitudes and job performance.

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1. Bellman, R., Friend, M. B., and Kurland, L. Simulation of the Initial Psychiatric Interview. Behavioral Science, 1966, 2(5), 389-399.
2. Vriend, J. A. A Fully Equipped Computer-Assisted Group Counseling Research and Training Laboratory. Educational Technology, February 1973, 57-60.
3. Meller, D. V. Using PLATO IV. CERL, University of Illinois, Urbana, October 1975.
4. Ajzen, I. and Fishbein, M. Attitudes and Normative Beliefs as Factors Influencing Behavioral Intentions. Journal of Personality and Social Psychology, 1972, 21, 1-9.
5. Fishbein, M. and Ajzen, I. Attitudes and Opinions, in P. Mussen and M. Rosenzweigh (Eds.) Annual Review of Psychology, 1972, Palo Alto Reviews, Inc, 1972, 23, 287-544.

In the process of pursuing these extended objectives, programs were developed or suggested which appeared to be of potential benefit to RTCs. Thus, a new phase of the project was initiated in FY 77 to develop a training and evaluation package (in accordance with the joint requirements of the RTC, Orlando, and the NAVTRAEQUIPCEN) around one of the previously developed programs, for adoption by RTC.

Detailed descriptions and results of the R&D performed prior to FY 78 are presented in other reports[6,7,8,9,10,11,12,13]. The current report presents an overall view of the entire project. However, an emphasis is placed on the activities and results from the FY 78 effort to complete the development, implementation, and evaluation of the newly configured CETS that was initiated in FY 77.

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6. Spencer, G. J. and Hausser, D. L.; Blaiwes, A. S. and Weller, D. R. Use of Computer-Assisted Instruction for Interpersonal Skill Training - A Pilot Study. 1975. Technical Report: NAVTRAEQUIPCEN 73-C-0133-1.
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11. Blaiwes, A. S., Weller, D. R., and Romot, G. Development and Implementation of a Computerized Evaluation and Training System (CETS) at a Recruit Training Command. March 1978. Technical Report: NAVTRAEQUIPCEN IH-300.
12. Weller, D. R. and Blaiwes, A. S. Leadership Dimensions of Navy Recruit Company Commanders and Recruit Morale and Performance. Psychological Reports, 1976, 39, 767-770.
13. Blaiwes, A. S. and Weller, D. R. A Social Simulator: Development and Evaluation. Educational Technology. March 1977, 14-20.

SECTION II

PROJECT OVERVIEW: FY 73 - FY 78

This section describes the results of efforts to meet the major project objectives discussed in the foregoing. At a very general level, the major objectives fall into the following categories:

Objective A - Evaluate the PLATO IV system.

Objective B - Develop, demonstrate, implement, and evaluate computer-based programs for instructing and evaluating CCs in the leadership and management areas.

OBJECTIVE A - EVALUATE THE PLATO IV SYSTEM

General experiences with the PLATO IV system have been documented in a variety of reports[14]. The most salient disadvantages of the system for this project's purposes were its costs of operation and its unreliability. These problems seem to be due to the total dependence of the system on long distance telephone lines; and perhaps to the developmental state of the system at the time it was used for this project.

In the interest of reducing these disadvantages, the PLATO IV system was replaced by a stand-alone minicomputer. This new system (described in a previous report[15]) performed all of the essential tasks previously performed by PLATO IV as well as some additional tasks (e.g., card reader input, video tape control) at a lower overall cost.

Certain features of the PLATO IV system could not be duplicated with the new system. However, only minor use of these features was made, and their absence was not a serious loss. One PLATO IV feature which was missed was the inter-user program access and communication capability, which allowed a ready interchange of programs and ideas among users. Some desirable applications for this feature were conceived, and one was partially developed and tested (a computer-moderated role play between two students). The decision to terminate the use of PLATO IV precluded further pursuit of these ideas.

Other PLATO IV features could not be duplicated on the new system (e.g., touch panel input, selective screen erase), but satisfactory methods for operating without these features were found, and their absence caused no major problems.

The absence of the TUTOR language of the PLATO IV system would have been a serious problem, especially since many programs had to be translated to the new system. However, a new computer language was developed which translated much of the TUTOR code to a form compatible with the new system.

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14. See footnotes 6 - 11 on page 8.
15. See footnote 11 on page 8.

The new system was superior to PLATO IV when it came to the input and storage of large amounts of data. The new system included a high speed optical card reader which allowed rapid entry of questionnaire responses, and a ten megabyte disk system which allowed storage of all RTC data. All inputs to the PLATO IV system had to be made through a keyboard, and data storage space allocated to each user was much smaller.

Another feature of the current system which was not available on PLATO IV was the automatic control of a video-tape player. The new system, with its high speed printer, also made the production of hard copies of programs and displays much easier (PLATO IV used a slower, wet-process copy machine).

OBJECTIVE B - DEVELOP, DEMONSTRATE, EVALUATE AND IMPLEMENT COMPUTER-BASED PROGRAMS

This R&D contributes a variety of information and products to CC training and evaluation in the area of leadership and management, as well as to the leadership and management areas in general. These contributions stem from the identification of behavioral objectives and training objectives, and extend to the operational-ready programs which are directed at these objectives. These programs are described in detail in the earlier project reports. These developments provide a framework for training and evaluation in these areas and offer useful and innovative procedures and materials for implementing the programs.

DEVELOP COMPUTER-BASED PROGRAMS. Seven major areas of development were identified in the various project reports. Four of these programs are designed to teach interpersonal and managerial skills by taking various job-oriented (simulation) approaches to the CCs job. Two other programs employ a Socratic approach to persuade the CC to act in certain ways. A final program provides evaluative and diagnostic information on the performance of CCs as well as serving as a general management tool for RTCs.

a. Case Study Program.[16] One job-oriented program takes the student through a "case study" in which the student selects a recruit chief petty officer and then assigns tasks to the company. The actions of the student are accomplished by selecting from a menu of choices which are used to gather information and take actions. The performance of the company improves or degrades depending on the quality of the decision making activities of the students, just as on the job.

b. Problem Situation Program.[17] The job-oriented characteristics of a second program consist of "problem situations" wherein interpersonal situations likely to be encountered on the job are described along with alternative responses commonly made by CCs to these situations. The student tries to choose the response that best represents the concepts being taught. Feedback is provided, tailored to the particular response selected, concerning why it is

16. See footnote 10 on page 8.
17. See footnotes 6, 8, 10, 11 on page 8.

correct or incorrect. Tutorial and drill and practice modes are employed to teach the concepts of interpersonal performance (e.g., giving feedback, setting goals) that apply in these situations. The job-oriented aspect of the instruction is derived from the fact that, in contrast with more theoretical approaches, the program teaches job skills by relating the skills to specific applications in specific job situations.

c. Video Problem Situations.[18] Two further approaches to the job-oriented mode utilize videotape to depict job situations better and to permit more natural responses to the situations. One of these programs replaces the verbal descriptions of the problem situations (described in the foregoing) with videotaped presentations of enacted and real-life interactions between CCs and recruits. The computer controls the videotape display, showing appropriate segments of tape at appropriate times. A drill and practice mode of instruction is employed to teach the lessons contained in the videotape scenarios.

d. Video Feedback Program.[19] In the other videotape program, the computer provides automated information displays, tape control, and data processing as forms of assistance to "judges" in their efforts to describe and evaluate student CC performance in role-played situations and to feed back this information to the students.

e. Attitude Discrepancy Program.[20] In the two Socratic approaches, the students are provided information and persuasive arguments in efforts to modify their behaviors. One such program determines discrepancies between a student's conceptions and intentions concerning the performance of specific behaviors (e.g., seeking help from other CCs) on the one hand, and RTC policy regarding these behaviors on the other hand. The program then addresses any discrepancies that were found to exist by showing the student that it is in his/her own best interest to comply with the policy of RTC.

f. Evaluation Information Program.[21] The second Socratic approach reveals any misconceptions which the student may have concerning the process used for evaluating CC performance. The student evaluates hypothetical profiles of CCs, and the computer uses regression analysis to determine the weights which the student placed on various evaluation criteria. These weights are then compared with the actual weights employed at RTC (determined by having the actual evaluators evaluate the same hypothetical profiles). Any differences that occur between these two sets of weights denote misconceptions held by the student regarding the evaluation process. CCs are expected to obtain better evaluations when their understanding of the evaluation process becomes more accurate.

g. Management and Evaluation Program.[22] This program presents displays of data which evaluate the performance of CCs and RTC in general. This

18. See footnote 11 on page 8.
19. Weller, D. R. and Blaiwes, A. S. Computer-Assisted Judging and Feedback of Interpersonal Skills, NAVTRAEQUIPCEN, in preparation.
20. See footnotes 7 and 9 on page 8.
21. See footnotes 7 and 9 on page 8.
22. See footnote 11 on page 8.

program is used by CCs to assess, diagnose, and improve their performance; and by managers at RTC to identify areas that require action, to determine the particular action to be taken, and to evaluate the effects of the action after it is taken.

The major features of this program are:

a. Automatic storage and processing of large amounts of data on many critical aspects of the RTC operation (e.g., organizational measures of recruit performance, attitudinal and evaluation data collected via surveys).

b. Automatic computation of relationships and differences among all categories of these data.

c. Automatic displays of these data with isolation of the most significant relationships contained in the data.

d. Automatic rankings of the CCs in accordance with their performance on any system variables which are selected and weighted for importance by RTC evaluators.

DEMONSTRATE AND EVALUATE COMPUTER-BASED PROGRAMS. There are two important aspects to the demonstration and evaluation of the products of this project. They should be: (1) functionally effective such that they appropriately accomplish RTC functions, and (2) cost-effective such that the RTC functions accomplished by the new programs justify the cost of their use.

Functional Effectiveness - Pre FY 78. Of the seven programs described in the previous section, three have been evaluated in previous reports (the problem situation program, the attitude discrepancy program, and the evaluation information program). The problem situation program was selected to be the basis of the current program. A brief review of the previous research on this program is presented below. For results of research on the other two programs, see the reports referenced in the previous section.

a. Skill Validity: Previous studies have consistently demonstrated the validity of the skills taught by the problem situation program. The skills have been correlated with several outcome measures such as recruit morale, recruit inspection scores, and recruit retention in the Navy. Nearly all of these correlations have been positive and significant, indicating that the skills are related to important measures at RTC.

b. Experimental/Control Skill Differences: Another consistent result of the previous studies is that the experimental subjects (those taught with the program) are rated by their recruits as performing the skills to a greater degree than control subjects. This positive training effect is most pronounced in students who are more motivated to do the CC job.

c. Experimental/Control Outcome Differences: Results concerning experimental/control differences on outcome measures (inspection scores, morale, retention) have been less consistent. Experimental subjects have performed at a higher level in the majority of cases, but few differences have been significant. The obvious importance of the outcome measures would make it worthwhile to determine why positive results were obtained in some instances and not in others.

Functional Effectiveness - FY 78. The program in use during FY 78 (CETS) was based on the problem situation program, with the addition of the video situation program and the management and evaluation program. The video feedback program is being evaluated and reported on in a separate effort.

First, results from the problem situation and video situation programs are compared with the results of previous studies. Following this, an evaluation of the management and evaluation program is presented.

Problem situation and video situation programs:

a. Skill Validity: Data on all variables (e.g., skill performance, background, outcomes, etc.) were collected on all CCs leading training units at RTC, Orlando from October 1977 until August 1978 (a detailed description of all variables is presented in a previous report[23]). Consistent with the previous results, these data showed that the skills taught in the two "situation" programs are valid. Scores on the ten skill areas were correlated with recruit inspection scores, recruit attrition scores, recruit morale scores, and division officer evaluation scores. These correlations are presented in Table 1. Of the 40 correlations presented, 34 are in the expected direction. Of the 25 significant correlations, 23 are in the expected direction.

b. Experimental/Control Skill Differences: All subjects for the FY 78 study were recent graduates of Company Commander School at RTC, Orlando. Over a period of approximately six months, each class in CC school was randomly divided into control and experimental subjects. The experimental subjects received the CETS training program in place of some "shadowing time" (i.e., watching active CCs do their jobs). This occurred between graduation and the picking up of their first training unit. The control subjects received no special treatment; instead, they continued to engage in normal shadowing activities.

Data were collected for experimental and control subjects. The data were identified as coming from regular, experimental, or control CCs to facilitate statistical comparisons. Data were collected on a total of 36 experimental and 30 control subjects.

The t-tests were performed on all skill variables as assessed by the recruit survey. These results are presented in Table 2 (numbers in Tables 2 - 7 are mean values). The N's for these and other tests exceed the number of subjects because many subjects had lead more than one training unit, and data were stored separately for each training unit.

None of the t-values in Table 2 is significant, and the differences are about equally divided between those favoring the controls and those favoring the experimentals. These results are inconsistent with the previous research.

A possible reason for these results concerns a policy change at RTC. Coincident with the beginning of the FY 78 study, RTC decided to place two CCs in charge of each training unit (one CC has lead each training unit in the past). Thus, each experimental and control subject was paired with another CC,

23. See footnote 11 on page 8.

usually one who had lead training units previously. It can be assumed that the second CC was a major influence on the behavior of the subjects. This influence could easily be greater than the influence of the experimental treatment, and it would tend to decrease or eliminate any experimental effects (especially where the training is at odds with traditional methods of leading training units).

c. Experimental/Control Outcome Differences: Tables 3 through 7 present the differences and t-values for the outcome variables. None of these differences is significant. Recruit attitude scores are about evenly split between those favoring controls and those favoring experimentals. The CC survey and MED scores predominantly favor the controls. The attrition scores all favor the experimentals, while the division officer survey scores all favor the controls.

These results are disappointing, and it is reasonable to expect that the addition of the second CC in a training unit would tend to reduct any experimental effect on these variables, in the same way as on the skill variables.

Management and evaluation program. This program is considered separately from the other programs because it is not strictly a training program. It was originally designed for the collection and analysis of experimental/control data, but it soon became apparent that the program had potential as a general management/evaluation tool at RTC.

TABLE 1. SKILL VALIDITY: CORRELATIONS WITH OUTCOMES

SKILL	RECRUIT MORALE	RECRUIT ATTRITION[a]	RECRUIT INSPECTION	D.O. SURVEY
Concrete	.58**	-.09	.43**	.16*
Timely	.58**	-.08	.48**	.27**
Clarifying	.65**	-.05	.22**	.06
Reasonable	.04	.20**	-.09	.14*
Relevant	.74**	-.04	.20**	.06
Considerate	.64**	-.16*	-.09	-.13*
Human	.66**	-.07	.05	.00
Goal Setting	.53**	-.03	.40**	.17*
Instruction	.67**	-.11	.34**	.16*
Feedback	.58**	-.12*	.21**	-.02
N	325	263	319	262

a. Negative correlations are desirable; i.e., high skill performance = low attrition.
* Significant at .05 level.
** Significant at .01 level.

TABLE 2. CC SKILL SCORES FROM RECRUIT SURVEY

SKILL	EXPERIMENTAL (N=59)	CONTROL (N=54)	t-VALUE
Concrete	4.14	4.21	-.90
Timely	4.14	4.16	-.36
Clarifying	3.76	3.77	-.22
Reasonable	3.07	3.02	1.21
Relevant	3.77	3.79	-.41
Considerate	3.55	3.54	.05
Human	3.98	3.96	.27
Goal Setting	4.05	4.09	-.88
Instruction	3.89	3.96	-.86
Feedback	3.62	3.63	-.03
Counseling	3.81	3.72	1.10
Motivating	3.66	3.65	.13
Reward/Punish	3.57	3.55	.23
Total Score	3.77	3.77	.00

TABLE 3. RECRUIT ATTITUDE SCORES

ATTITUDE	EXPERIMENTAL (N=59)	CONTROL (N=54)	t-VALUE
Respects CC	4.38	4.40	-.18
Morale	3.89	3.91	-.23
Boot Camp	2.85	2.86	-.21
Esprit de Corps	4.47	4.43	.93
Reenlistment	3.39	3.36	.58
Navy	4.32	4.31	.43
Training	4.15	4.11	.88
Attitude Total	3.92	3.91	.29

TABLE 4. CC ATTITUDE SURVEY

ATTITUDE	EXPERIMENTAL (N=41)	CONTROL (N=38)	t-VALUE
CC School	3.09	3.38	-1.74
Job in General	3.65	3.93	-1.61
Recruits	3.43	3.57	- .97
Division Staff	3.92	3.75	1.01
RTC	2.99	3.30	-1.56
Survey Total	3.41	3.59	-1.37

TABLE 5. DIVISION OFFICER SURVEY

VARIABLE	EXPERIMENTAL (N=44)	CONTROL (N=44)	t-VALUE
Bearing	4.27	4.39	- .83
Reliability	3.95	4.14	-1.42
Adaptability	3.87	4.05	-1.47
Initiative	3.92	4.14	-1.31
Cooperativeness	4.01	4.23	-1.64
Counseling	3.85	4.12	-1.52
Management	3.82	3.94	- .81
Problem Solving	3.80	3.92	- .88
Discipline	3.85	3.98	- .87
Quality of TU	3.86	4.04	-1.40
Evaluation of CC	3.29	3.76	-1.89
Survey Total	3.87	4.06	-1.45

TABLE 6. RECRUIT INSPECTION (MED) SCORES

SCORE	EXPERIMENTAL (N=41)	CONTROL (N=39)	t-VALUE
Personnel	3.57	3.62	-1.30
Barracks	3.81	3.84	- .72
Locker	3.07	3.10	- .38
Infantry	3.54	3.59	-1.16
Streetmarks	12.37	12.38	- .01
RPBs	88.4	87.4	.14
MED Total	3.50	3.54	-1.00

TABLE 7. RECRUIT ATTRITION

VARIABLE	EXPERIMENTAL (N=42)	CONTROL (N=38)	t-VALUE
Regular Setbacks	6.40	6.57	-.17
Special Setbacks	13.95	15.00	-.87
Re-recycles	3.82	4.36	-.80
Total Setbacks	20.20	21.39	-.63

Basically, the program allows rapid input, storage, processing, and output of a wide variety of variables concerning RTC. The processing options include grouping of data in a variety of ways: t-tests, analysis of variance, correlations, multiple regressions, and the automatic ranking of CCs according to their scores on a wide variety of variables (selected and weighted by RTC personnel). A more detailed description of this program is given in a previous report.[24] Examples of some of the outputs are given in Appendix A.

24. See footnote 11 on page 8.

(For reasons of data security, the data shown in this appendix are not actual, current data; but are from a developmental test of the system.)

A program of this type has almost limitless applications, and RTC has already used it in a variety of ways. The following items are a sample of some of the recent findings:

a. Training units with two CCs (as compared to those with one CC) have higher recruit inspection (MED) scores, higher skill performance ratings of CCs, higher division officer ratings of CCs, greater recruit respect for CCs, but greater attrition.

b. Recruits in training units with high MED scores are more favorable to the current situation (higher morale, respect for CC, liking of RTC), but less favorable about the future (esprit de corps, attitude toward Navy in general, intention to reenlist).

c. CCs who earn higher MEDs emphasize the technical side of the job at the expense of emotional considerations.

d. Overall recruit attitudes are positively related to the overall performance of the CETS skills by their CCs.

e. Division officers rate CCs higher when they tend to emphasize the technical side of the job and deemphasize the emotional side.

f. Total attrition is increasing at RTC over time.

The programs have been used for other purposes at RTC, including the selection of the "sailor of the quarter," the counseling of CCs, and the selection of personnel for certain jobs. Consideration is now being given to the possibility of obtaining data from CETS that would allow the prediction of the quality of a CC's performance prior to and/or very early in his/her assignment as a CC (thereby providing a basis for selection and special early training for CCs).

Cost-Effectiveness. The previous technical report from this project[25] discussed the cost-effectiveness of using the CETS program at RTCs. The major conclusions from this discussion were:

a. A major technical and administrative effort would be required to assess the cost-related effects of the program.

b. A rational approach to organizational development requires cost-effectiveness data for all aspects of the operation of the RTCs.

c. In the absence of fundamental effectiveness measures (i.e., performance of recruits after RTC), cost savings can be assumed if the new programs provide more efficient methods of performing required tasks. The extent to which a task is required must be a subjective judgment at this time. The

25. See footnote 11 on page 8.

tasks performed by the CETS system would appear to be required at RTCs. Clearly, the advantages of the CETS system over other methods of performing the same tasks are great, and easily justify the costs of the system.

d. Measures of recruit attitude, morale, and motivation are difficult to quantify in fiscal terms; however, experimental results show that such data can be quite meaningful. These results indicate that these measures might be useful in reducing costs.

e. Another approach to cost-effectiveness assessment can be used where new programs are substituted for existing programs. Unfortunately, most of the tasks performed by the CETS programs either were not performed previously at RTCs, or a substitution approach to their evaluation was not feasible. The cost savings for the few areas where a substitution approach was used, however, indicate that these functions alone can justify the maintenance costs of the system. Further, several additional areas where the system could easily substitute for less efficient methods are apparent. Use of the system in these areas would make its cost justification even more compelling.

These conclusions still appear to be valid. A comprehensive cost-effectiveness assessment of the CETS system continues to be elusive; however, additional information that can be subjected to a conventional cost analysis has become available.

The purchase price of the system was $35,000; and $5,000 per year is required for maintenance. These costs are variable depending on when the system is acquired and which programs are desired for implementation. For example, a computer system costing as little as $4,000 to purchase and $1,000 per year to maintain would be adequate for operation of the basic problem situation training program.

The only direct cost in addition to equipment costs is the cost of the personnel required for operation of the system. This cost is also variable, depending on the tasks assigned to the computer. A minimum of about 12 man-hours per week is required for data collection and entry. However, several hours per week were devoted by RTC to survey administration before the advent of the CETS system, so most of these 12 man-hours would be expended even without CETS. The number of additional man-hours required for other CETS related tasks also depends on the extent to which each activity can be integrated into other ongoing activities at RTC. For example, the cost of CETS related counseling of CCs should not be attributed to CETS if the counseling replaces existing counseling activities at RTC.

Ideally, an education/programming billet should be provided for the operation and improvement of CETS. This billet should free time from other billets in that it would accomplish tasks (e.g., counseling, training, data analysis) that normally are performed by a number of other positions; and are performed less efficiently due to the lack of computer assistance. It is very difficult to ferret out the time savings that might result from the assignment of all such tasks to a single CETS billet, but the savings should be considerable. Further, as more tasks are assigned to the computer in the future, the work load on other RTC personnel should be further relieved.

The only quantifiable cost savings at this time are: (1) about $3,000 per year for computer processing of recruit attitude data, and (2) about $3,000 per year for processing of CC school scores. No dollar estimates can be placed on the improved accuracy of the data provided.

Proper use of the evaluation program should result in considerable cost savings. For example, it is possible to determine which variables are related to recruit attrition. Using the system, it has been found that CCs with five to ten years and over 20 years in the Navy have significantly greater total "drop out" rates (about 25%) than CCs with 0-5 years in the Navy (about 16%). Findings such as these suggest a potential for selecting and or training CCs in ways that lead to reduced attrition. Such possibilities would be pursued in future efforts on the project.

The CETS system should be used to determine the appropriateness of such actions, and to monitor the effects of any actions that are taken. A case of an actual application of this sort can be provided. The effects of operational changes at RTC are now determined in a small fraction of the time that previously was required, through use of the automatic data processing capabilities of the system. For example, the effects of changing from one CC to two CCs per training unit were determined in a couple of hours. This same task would have required at least two man months to accomplish prior to the introduction of the system at RTC.

Similar savings can be attributed to this system for a host of other administrative type tasks. For example, if the process now being used to select CCs for jobs and honors (e.g., sailor of the quarter) were to be attempted without the aid of the system, an estimated 20 additional hours per week would be required to even approximate the operations now performed. The system also produces information critical to the counseling of CCs, which would require untold hours to acquire by more traditional means. (This is just a small sample of the many ways the system is and can be used and estimates of the money saved due to these operations, although considerable, is ill-defined at this time).

IMPLEMENT COMPUTER-BASED PROGRAMS. The CETS program has been in continuous use at RTC, Orlando for approximately one year. RTC personnel have made extensive use of the management and evaluation programs, and have expressed the desire to see these programs continue. Due to the disappointing results of the recent evaluation of the training programs, further development and testing would be required before the training portions of the CETS program are ready for operational acceptance at RTC.

One of the concepts of the CETS evaluation and management programs is that they provide built-in "self-correctional" features. Basically, CETS is designed to be used by RTC as a tool for organizational development, and it appears critical that the targets of this development should include CETS itself. Thus, one appealing approach to the enhancement of training in the area is to provide "self-correcting" capabilities (such as the present ones) whereby the programs can be gradually configured and continually reconfigured by operational personnel to meet operational requirements.

To help facilitate such applications of CETS in general areas of organizational management and development, a "performance report" was prepared based

on the data from CETS. This report, following several more limited reports on the subject, summarized some of the findings (see previous section) and conclusions derived from the CETS evaluation and management system and, on the basis of these findings, recommended actions for possible implementation at RTC. Some examples of the actions recommended are:

a. Promulgate the procedures employed with the CETS CC ranking program to evaluate and select CCs and extend the use of this ranking program to other areas at RTC.

b. Establish the top ranked CCs and Divisions (as determined by CETS) as elite groups by recognizing and rewarding them in appropriate ways.

c. Instruct CCs to adjust their instructional strategies to suit the requirements of particular instructional situations in accordance with findings from CETS (e.g., teaching infantry is facilitated by a "tougher" approach - i.e., striving for higher goals and setting shorter time limits for learning - than in teaching other MED areas).

d. Capitalize on the resources at RTC by soliciting lists of recommendations for action from the most creative and capable personnel at RTC. These recommendations would be based on these performance reports and other data that may be gleaned from CETS and other sources. Implement and evaluate (via CETS) the best recommendations and appropriately reward the people who provide them.

This first general performance report was intended to serve as a working model which could be improved with use at RTC. One of the major benefits of the performance report would appear to be that it allows organizational errors to be detected and openly acted upon. This is accomplished by bringing common information on organizational functioning to the attention of a large number of organizational managers. It seems that failures in organizational development efforts ". . . are often ignored or denied, sometimes remain completely unrecognized, are rarely analyzed, and are almost never legitimized as valuable sources for learning. The result . . . is that errors in (organizational development) . . . theory and technology are perpetuated, common problems are labeled unique, and dominant practices remain unquestioned.... We must learn how to reward the personal vision and organizational commitment that fully recognize the problems in creating change, that fully accept that errors are inevitable in these undertakings, yet still choose to risk, to persist, and to learn from the errors in . . . (organizational development)."[26] Thus, CETS provides the basis for a critical but often missing aspect of an organization, viz., the ability to be "self-correcting."

RTC needs to be able to develop and use the performance report discussed in the foregoing, in order to optimally implement the "self-correcting" capabilities provided by CETS. A variety of procedures can be used to develop the performance report, depending on the informational needs of RTC. The procedures employed for the first prototype model of this report were:

26. Mirvis, P. H. and Berg, D. N. in ISR Newsletter. Institute for Social Research. The University of Michigan, Spring 1978, p. 6.

a. Correlations were obtained between each variable of major interest and all other variables on the system.

b. The t-tests and analysis of variance tests were obtained between and among all variables of major interest.

c. The significant relationships found with each test were noted and common findings among the various tests were determined.

d. Tentative conclusions and recommended courses of action were derived based on clusters of these related findings.

These procedures are quite preliminary. It is expected that improvements in the procedure would best evolve through continued use at RTC. Efforts are now underway by RTC to secure support and funding to make the evaluation portion of CETS a permanent operational system at RTC.

Preliminary evidence is available to indicate that RTC, in the main, does have the capabilities to properly use, maintain and extend the management and evaluation programs of CETS. In the couple of months since NAVTRAEQUIPCEN support has virtually ended, RTC, Orlando has, under their own initiative and control, planned and initiated a number of highly desirable projects based on CETS. Some of these projects which have come to the attention of the present authors are listed in the following:

- o Scheduling for Master Training Schedule
- o Plot variables over time by T. G. average
- o Convert DO surveys to annual evaluation marks
- o Correct and P-factor (i.e., item validate) CC school academic tests
- o Develop counselling problems on video-tape for CC School instruction
- o Use test-score program developed for the fourth item (above) to store, process and compute grades for CC school students
- o Sort division scores by specific division officer (by name)
- o Compare ASVAB scores (total and component) with attrition
- o Compare AFQT and Navy screening test scores for recruits with recruit attrition
- o Schedule MED inspections
- o Compute and file the MED inspection results
- o Maintain CC rotation list
- o Put recruit test bank on the computer and generate random tests for recruits quarterly (or other period)

o Develop and test questionnaire items for selecting the best CC candidates for CC duty prior to their assignment at RTC.

Trial and error is bound to occur in the process of developing and implementing improvements as suggested by these sorts of programs. However, due to the relative ease of detecting and correcting errors and generating new and innovative trials with CETS, these processes should be far less costly and more likely to succeed than if they were performed by the more traditional, manual methods. Thus, CETS can provide the means to greatly increase the speed and expand the scope of the trial and error process, which seems to be integral to the development and operation of new procedures (as represented in the foregoing) no matter who does it or how it is done. RTC, Orlando has demonstrated an orientation and motivation at "self-correction" prior to the availability of CETS. These qualities are essential to the proper utilization of CETS by an organization. Thus, RTC, Orlando currently provides a desirable situation to test CETS. The extent to which this condition will be maintained at the RTC and can be produced in other organizations are topics for further research.

As an example of a "trial" currently being conducted by RTC, a questionnaire has been developed by RTC consisting of items which distinguished "good" and "poor" CCs once they are at RTC, as determined from CETS data. A test is now being considered in which information on these same items will be obtained for candidate CCs prior to their assignments at RTC. If these items distinguish between good and poor CCs before they are selected for CC duty, CC selection can be decided on a firmer basis and the consequent elevation of CC quality could have a tremendous impact on recruit training.

OTHER RESEARCH PRODUCTS WITH POTENTIAL FUTURE USES

This research project has been directed at the training and evaluation of CCs at RTCs. However, the job of CC and the environment of RTC have much in common with other jobs and other organizations. Thus, many of the findings developed during the course of this project have relevance for organizations in general, as well as RTCs in particular. Three areas to which these findings apply are: (a) leader/manager training and evaluation, (b) the evaluation and management of organizational operations, and (c) training media.

a. Leader and manager training and evaluation.

(1) Interpersonal skills and behaviors performed by leaders were identified and relationships between this performance and the effectiveness of the leader were established. The validation of these skills and behaviors would recommend their inclusion in training and performance evaluation programs, especially for situations similar to that of the CC. This information also contributes to the general literature on the characteristics of successful and unsuccessful leaders.

(2) Certain types of attitudes held by leaders were found to be highly predictive of their behavior, and other types of attitudes were found to be unrelated to their behavior. These validated attitudes can provide instructional objectives and criteria for training and evaluation programs, as well as contributing scientific information on relationships between attitude and behavior.

(3) Discrepancies in the conceptions held by the personnel in an organization concerning behaviors appropriate to the organization were identified, quantified, and related to organizational position. This information should suggest instruction and other actions designed to reduce the discrepancies existing in an organization.

(4) A framework of computer-based procedures for effecting attitude and behavior change in leaders was developed. The specifics of thes procedures were developed and tested, and organizational conditions that act to facilitate or inhibit these changes were noted. The seven basic approaches that make up this framework can be applied in total or in various combinations to achieve the training objectives and administer the evaluation programs identified in this project, as well as for additional purposes that may be devised. This framework can also suggest alternate approaches to the training/evaluation problem that might improve upon the current versions.

(5) With certain procedural modifications, the materials of both the problem situation program and the Socratic programs can be applied with non-computer techniques. In fact, RTC has manually applied the behavioral and evaluation criteria identified in the process of developing the Socratic programs. Further, role playing exercises developed during the production of video tape lessons have been used by RTC on a routine basis before the associated computer programs were operational.

(6) A job-oriented approach to instruction (i.e., the instruction is related to specifics of the CC's job) was demonstrated to be feasible for the leadership/management area. This is in contrast to the more theoretical, abstract forms of instruction often used in this area.

b. Management and evaluation of organizational operations.

(1) Procedures and materials for involving managers in the use of scientific research methods as an integral part of their jobs were identified and developed, and their operational feasibility was established.

(2) The degree to which valid and trusted measures of organizational success are available was identified and the probable effects of deficiencies in these measures were discerned. The absence of suitable success measures is a basic problem for RTCs as well as other organizations, and R&D is needed to determine how to obtain and use them.

(3) The findings already derived from the evaluation program can be used as a basis for managerial actions at RTC for as long as the data remain current. Further data can be processed manually; however, if substantial data are required, this task would soon exceed the capabilities of the organization.

c. Training media.

(1) The feasibility and desirability of the coordinated uses of video tape and a computer in training was demonstrated. Instruction using life-like video tape situations was demonstrated, along with methods for aiding in the evaluation of a person's interpersonal actions as seen on video tape and the feedback of this evaluation to the performer.

(2) A capability was developed for translating the TUTOR language of the PLATO IV system into a language compatible with NOVA minicomputers.

SECTION III

DISCUSSION AND CONCLUSIONS

There is a sizeable body of research literature on the effectiveness of training and evaluation for the interpersonal and affective areas of the leader/manager job. This research indicates that these training and evaluation programs often make little or no detectable difference to organizational success, or even to job behavior.[27] Still, the use of such programs is widespread, and seems to be increasing. That high importance is placed on Navy programs in this area is evident in the statements of people in the highest governmental positions, as well as in the nature of ongoing R&D programs. For example, a recent message from Admiral Hayward, the newly appointed Chief of Naval Operations (CNO), gave special emphasis to the need for improved management and leadership. One major CNO objective was:

> "Improving the quality of leadership at all levels of the Navy through a program of formalized training in leadership and management skills at those stages in officers' and petty officers' careers where such training is most needed and can be especially productive."[28]

Operational programs reflecting these concerns are also noted. For example, a new BuPers program called Leadership and Management Education and Training (LMET) is a ". . . centralized, systematic approach to leadership and management development . . ." which is intended to provide instruction for ". . . the whole Navy. . . ."[29]

Thus, it appears that training and evaluation programs should and will be implemented in this area. Further, these programs will be developed, evaluated and selected on some basis - intuitive, empirical, and/or experimental. All such bases were employed in the present R&D. Taken as a whole, the effectiveness evaluations of the programs were generally favorable, especially when compared with results from similar efforts. However, the results were still not strong enough to constitute a major contradiction to the generalization that program effectiveness in the area rests on shakey grounds. The major reason for the lack of more complete confidence in the training programs is the failure of the most recent experimental evaluation to support the favorable findings of the earlier evaluations (more discussion of program shortcomings is contained in the following). Nevertheless, overall results from the present project were sufficiently encouraging to recommend further pursuit of this R&D and implementation of its products in operational settings.

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27. Fiedler, F. E. The Trouble with Leadership Training is that It Does Not Train Leaders. Psychology Today, February 1973.
28. The Centerline, Naval Training Equipment Center, Orlando, Florida. Vol. XI, No. 29, July 20, 1978.
29. Leadership and Management Evaluation and Training (LMET). All Hands. May 1978. No. 736, pp 4-7.

Rationale for these recommendations rests on the favorable nature of most of the findings of the experimental evaluations of the training programs. Further, the face validity of the skills of these programs seems to be good (i.e., the skills being taught appear to represent the skills the Navy wishes to teach) and the methods for teaching the skills appear to be effective and efficient. The favorable face validity of the training technology employed by CETS is contributed to by its use of automatic and individualized computer-assisted features with the addition of computer-controlled video tape presentations, all of which are integrated into more general programs of performance evaluation and data analysis.

This favorable assessment of face validity is further supported by the correlational data which demonstrated the empirical validity of the subject matter of the programs, and by the student and organizational acceptance of both the subject matter and procedures of the programs.

Finally, the present programs provide sophisticated, field tested data collection and processing capabilities for use by managers in their organizational development efforts, including the continual improvement of the training and evaluation systems.

These accomplishments are considerable. However, they do not obviate the shortcomings of the R&D, and these too must be addressed. Among the most apparent and damaging of the shortcomings were the failures to more adequately: (a) improve and evaluate the program materials; (b) obtain organizational emphasis on the use of the programs; (c) achieve organization-wide indoctrination onto the programs; (d) implement the training in remedial and refresher modes.

Such deficiencies, however, seem to be natural by-products of the traditional R&D approach, and are not likely to be remedied in the current effort (or in other efforts in the area) until alternate R&D paradigms are found. Perhaps the primary rationale for recommending further use of CETS at RTC and further development of the CETS concept in the military is that, with CETS, such alternative R&D paradigms may have been found. The present programs apparently offer the only embodiment of certain alternative R&D procedures that seem to be needed for improved results in the area.

With traditional R&D procedures, a general program format is selected, often on intuitive or face-validity bases. Then, if research is performed, it essentially stops at the time the system is implemented in the operational environment. This approach would seem to work best where the continued validity of the instruction is well assured. In contrast, in training for leadership and management, program validity is in doubt initially, and even more so in the future.

The need for continuous evaluation, revision and update of training programs is beginning to receive some attention in the general training field. This attention, however, is mainly in the form of proposals, speculations and token gestures and very little seems to have been done to actually implement a comprehensive program to facilitate these processes. Further, except for a few sporadic, enlightened R&D programs, this need still does not receive the emphasis it deserves.

One example of such an enlightened program is the Instructional Systems Development program at NAVTRAEQUIPCEN.[30] This project takes the position that instructor training courses will include ". . . a detailed 'how to' of course evaluation, revision and update." The authors state that ". . . this requirement is considered of extreme importance if a viable weapons system training program is to be maintained." This requirement stems from changes in training objectives, etc., as well as ". . . the normal tendency of a new program to deteriorate with time and personnel turnover. . . ."

To this end, this program has initiated an R&D program for providing computer aids to the process of developing and modifying course materials to be accomplished both before and after a training program has been implemented. The present technology, however, is designed to go beyond application to single training systems. It is intended to extend the self-correcting concept to aid in managerial efforts to maintain and improve entire organizations, which include all the individual training and operating systems that comprise the organization.

What appears to be needed in the interpersonal skills area is an operationally-attuned R&D program that continues as an integral and routine part of the operation of the system. This seems especially to be required in this area because the effects of the important variables of leader/manager performance are accessible only in the ultimate operational context and over extended periods of time.

An illustration of how the traditional R&D paradigm fosters the sorts of shortcomings noted in the foregoing is provided by the inability in this project to determine the influence on trained CC performance resulting from the change from one to two CCs per training unit. With continuous R&D, enough data could be collected to ascertain the effects of the change; and with operationally-oriented R&D, only the situation where both CCs had the same training would need to be investigated (in the present case, only one CC was trained).

Another problem encountered in the present R&D also indicated the need to deviate from traditional, short-term, non-operational R&D approaches. It is nearly impossible (if not undesirable) to isolate the control group from some aspect of the experimental treatment. Experimental contamination stemmed from actions taken by the RTC organization to transmit information to anyone who needed it, even if that information was part of the experimental treatment. Contamination probably also occurred in the course of casual interactions among experimental and control students. Such communications are desirable in that they indicate positive attitudes toward the materials, and they assist in the instructional process. However, such actions defeat the purposes of the experimental/control approach.

30. Funaro, J. F. and Bird, R. G. US Navy Instructional Systems Development Operational Aviation Programs. Interim Progress Report for US Air Force, Flying Training ISD Workshop, Washington, DC. Human Factors Laboratory, NAVTRAEQUIPCEN, Orlando, FL, 3 February 1976.

Further, proper implementation of a program of this nature seems to require universal (not experimental vs. control) administration. When all organizational personnel have been exposed to the same materials, the opportunities for mutual reinforcement of the instructional concepts and behaviors is greatest. With the present design, however, the control group and other members of the organization who were given a very superficial, if any, introduction to the programs were not in a position to contribute this reinforcement. On the contrary, these unindoctrinated personnel would be expected to disparage new ways of acting that conflict with their own (such a reaction was often observed in students in their initial responses to training on CETS).

Not only should R&D be continuous with the training, but the training should also be continuous with each student. Permanent behavioral changes in this area apparently do not occur suddenly, but rather undergo cycles of testing, rejection, and re-adoption by the student before they replace existing lifetime habits and become stable components of a person's behavioral repertoire. Thus, as with short-term R&D, it is not likely that short-term training in this area would demonstrate consistently large on-the-job effects. It is more reasonable to expect the desired outcomes to result from a series of short-term training experiences.

One prime function of the CETS programs is to provide diagnostic information on CC performance so as to provide a basis for continual remedial training for the CC throughout his/her tour at RTC. Unfortunately, this function was developed too late to receive adequate evaluation. Primary among the advantages expected from the remedial training approach in this situation is that it would allow CETS training to compete on an equal basis with the other considerable demands on a CC's time. Whereas CETS training is viewed as a means for becoming a more effective CC, CCs have other tasks to accomplish at RTC which are necessary if they are to operate at even a minimal level. Thus, these other tasks naturally take precedence over the "nice to know but not essential" perceptions of the CETS training. With the remedial approach, however, CETS training would be instituted when a CC is failing to perform adequately on some aspect of the job which CETS is designed to improve. This would change the status of the CETS training from "nice to know" to "essential" and greatly improve the motivation to learn.

The introduction of remedial training is only one way that student motivation could have been improved. As suggested in the foregoing, the failure of the organization to introduce personnel to the contents of the programs, and to emphasize the use of the programs (which are attributed in large part to restrictions in the traditional R&D paradigm) could also undermine the motivation of the students to learn and use the training materials. Correction of these deficiences (which would be facilitated by CETS) should make a major improvement in training effectiveness. Evidence for the particular importance of student motivation in this area is provided by the current finding of an interaction between student motivation and training effectiveness (discussed in the foregoing) as well as general confirmation of this finding in other research in the area.[31]

31. Hinrichs, J. Personnel Training in Handbook of Industrial and Organizational Psychology. Rand McNalley, 1976, edited by M. D. Dunnette, p. 856.

Thus, under this plan, the design of the instructional and evaluation programs would be tentative and initially of secondary importance. The critical part of the initial development would be to provide mechanisms suitable for use mainly by non-R&D personnel for continual modification and evaluation of the programs and an instructional framework into which the modifications could be readily implemented. CETS is intended to provide such capabilities.

Only with the continuous information that a system such as CETS would provide can programs be evaluated and more optimal training and evaluation configurations be designed. Further, the availability of continuous feedback is important not only for the improvement of training and evaluation programs for leaders and managers but it also is critical to any manager's effectiveness across a wide range of tasks and at all levels of an organization.

The importance of feedback to managers and the problems involved in getting and giving it have been noted in the general literature on management and leadership processes, as addressed in the following:

> Human learning depends on feedback on the results of one's behavior. Given the fragmented, oral nature of managerial work, leaders often get vague and miscellaneous feedback. Because they are generalists, superficially involved with many different projects, intimately involved with only a few, it is difficult for them to give feedback as well. Both giving and receiving feedback, however, is critical to their effectiveness.
>
> Building a network of contacts, extracting important information and passing it on, designing tasks to provide useful feedback, and simply exchanging information are how managers spend the majority of their time....
>
> Setting up feedback systems, judgment systems, and systems for dealing with stability and instability may be a major factor in leadership effectiveness. Such structures are the leader's methods of chopping up reality and capturing vague intuitions and bits of information to see which actions need to be taken.[32]

The evaluation program of CETS is an extremely efficient mechanism for "building a network of contacts," "extracting important information," "exchanging information," and other functions that managers must perform in order to obtain and provide the feedback required by their jobs. To attempt to perform these managerial functions by more traditional means would be exorbitant if not impossible. To fail to perform these functions by any means would be to omit some essential elements from the managerial process.

32. Lombardo, M. M. Looking at Leadership: Some Neglected Areas. October 1977, Office of Naval Research TR 2, pp 19-20.

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APPENDIX A

SAMPLES OF MANAGEMENT AND EVALUATION SYSTEM OUTPUTS

(For reasons of data security, the data shown in this appendix are not actual, current data; but are from a developmental test of the system.)

TOTAL N EQUALED 401, AND THE PRODUCT MOMENT CORRELATION WAS EQUAL TO 0.549.

Y = MORALE X = CONSIDERATE

The increment for X is 0.047; for Y it is 0.059.

Figure A-1. Product-Moment Correlation Output

NAVTRAEQUIPCEN IH-307

CHOOSE AN OPTION AND A VARIABLE NUMBER

VAR. #	VAR. STATUS	VARIABLE NAME		ASSIGNED
1.	IN USE	CONSIDERATE	(27)	50%
2.	IN USE	MORALE	(36)	50%

RANKING	COMPANY COMMANDER		SCORE	T. U.'S LEAD
#1	AG1	A	4.516500	2 T.U.'S
#2	BTCS	B	4.457001	1 T.U.'S
#3	AMS1	C	4.381500	1 T.U.'S
#4	PH1	D	4.355500	2 T.U.'S
#5	ABCS	E	4.354501	1 T.U.'S
#6	AE2	F	4.347000	1 T.U.'S
#7	BTC	G	4.326251	2 T.U.'S
#8	HTC	H	4.316001	1 T.U.'S
#9	SK2	I	4.312751	2 T.U.'S
#10	BMCS	J	4.311001	1 T.U.'S
#11	NC1	K	4.305000	1 T.U.'S
#12	YN1	L	4.301500	1 T.U.'S
#13	ENCS	M	4.298000	1 T.U.'S
#14	OSC	N	4.291500	1 T.U.'S
#15	MMCS	O	4.268500	1 T.U.'S
#16	TM2	P	4.266500	1 T.U.'S
#17	BTC	Q	4.257251	2 T.U.'S
#18	DK1	R	4.252501	1 T.U.'S
#19	EM1	S	4.246000	1 T.U.'S
#20	MMCS	T	4.241501	1 T.U.'S

Figure A-2. CC Ranking Program Output

CATEGORY VARIABLE BEING TESTED IS "MORALE"

GROUP VARIABLE t-TEST BEING PERFORMED ON IS "CC RANK"

#04 by #05; t = 1.196 & df = 58.
by #06; t = 0.987 & df = 149.
by #07; t = 1.019 & df = 156.
by #08; t = 1.430 & df = 28.
by #09; t = 1.374 & df = 4.

#05 by #06; t = -1.633 & df = 207.
by #07; t = -0.719 & df = 214.
by #08; t = 0.397 & df = 86.
by #09; t = 0.031 & df = 62.

#06 by #07; t = 1.120 & df = 305.
by #08; t = 1.712 & df = 177.
by #09; t = 0.592 & df = 153.

#07 by #08; t = 0.960 & df = 184.
by #09; t = 0.269 & df = 160.

#08 by #09; t = -0.171 & df = 32.

MEAN FOR CC RANK = E4 WAS 4.2530
MEAN FOR CC RANK = E5 WAS 3.8856
MEAN FOR CC RANK = E6 WAS 3.9604
MEAN FOR CC RANK = E7 WAS 3.9207
MEAN FOR CC RANK = E8 WAS 3.8591
MEAN FOR CC RANK = E9 WAS 3.8812

ANOVA TABLE BY CC RANK FOR MORALE

SOURCE	ss	df	MEAN SQUARE	F
TOTAL	37.699	401.		
BETWEEN	0.523	5.	0.105	1.112
WITHIN	37.176	395.	0.094	

Figure A-3. t-Test/Analysis of Variance Output

YOU HAVE CHOSEN "MORALE" AS THE DEPENDENT VARIABLE

1).	MORALE	R = 1.000	(N = 325.)
2).	RECRUIT ATTITUDES	R = 0.824	(N = 325.)
3).	MOTIVATING	R = 0.745	(N = 325.)
4).	RESPECTS CC	R = 0.677	(N = 325.)
5).	INSTRUCTION	R = 0.669	(N = 325.)
6).	REWARD & PUNISHMENT	R = 0.665	(N = 325.)
XX 7).	COUNSELING (RC)	R = 0.657	(N = 325.)
8).	CLARIFYING	R = 0.653	(N = 325.)
9).	RELEVANT	R = 0.631	(N = 325.)
10).	BOOT CAMP	R = 0.614	(N = 325.)
XX 11).	CONCRETE	R = 0.583	(N = 325.)
12).	TIMELY	R = 0.583	(N = 325.)
XX 13).	CONSIDERATE	R = 0.581	(N = 325.)
14).	HUMAN	R = 0.580	(N = 325.)
15).	FEEDBACK	R = 0.574	(N = 325.)
16).	TRAINING	R = 0.555	(N = 325.)
17).	NAVY	R = 0.538	(N = 325.)
18).	ESPRIT DE CORPS	R = 0.533	(N = 325.)
19).	GOAL SETTING	R = 0.496	(N = 325.)
20).	RE-ENLIST	R = 0.360	(N = 325.)
21).	T. GROUP	R = 0.187	(N = 325.)
22).	MED PERSONNEL	R = 0.162	(N = 319.)

TYPE IN THE NUMBER NEXT TO THE INDEPENDENT VARIABLE
TO INCLUDE IN/DELETE FROM THE REGRESSION ANALYSIS, /OR
TYPE 'V' TO RETURN TO THE LIST OF DEPENDENT VARIABLES, /OR
TYPE 'N' TO SEE THE NEXT PAGE OF CORRELATIONS, /OR
TYPE 'P' TO SEE THE PREVIOUS PAGE OF CORRELATIONS

Figure A-4. Multiple Correlation Output

MULTIPLE REGRESSION FOR MORALE

with

CONCRETE
CONSIDERATE
COUNSELING (RC)

REGRESSION STATISTICS:

MULTIPLE R = 0.69558
R SQUARED = 0.48383
STANDARD ERROR = 0.33478

ANALYSIS OF VARIANCE	SS	OF	MS	F
REGRESSION	33.72176	3.	11.24059	100.29560
RESIDUAL	35.97595	321.	0.11207	

REGRESSION EQUATION IS:

MORALE = -0.67244 (CONSTANT)
+ CONCRETE X 0.34632 (BETA = 0.27406)
+ CONSIDERATE X 0.39555 (BETA = 0.22378)
+ COUNSELING (RC) X 0.41451 (BETA = 0.29551)

Figure A-5. Multiple Regression Output

DATA SELECTED FROM COMPANY COMMANDER SURVEY. PLOT CATEGORY IS: "JOB IN GENERAL"
PLOT BEGINS WITH T.U. #3001 AND ENDS WITH T.U. #3060 FOR DIVISION #7

1 2 3 4 5	VARIABLE VALUE	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	5.000	DECEMBER
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.333	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	5.000	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	3.000	JANUARY
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.000	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.000	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.333	FEBRUARY
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.000	MARCH
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	3.666	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	3.666	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.666	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.666	APRIL
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	2.666	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.000	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.333	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	2.666	MAY
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	3.666	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.000	JUNE
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	3.666	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.333	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.333	JULY
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.333	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.333	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.333	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.666	AUGUST
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	3.833	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.500	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.083	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.500	
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	5.000	SEPTEMBER
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXF	4.667	

AVERAGE THIS PLOT = 4.137 N = 31

Figure A-6. Historical Plot of Variable